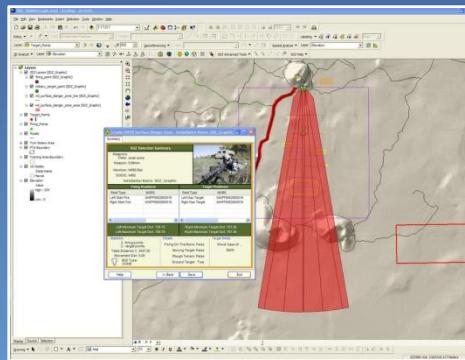
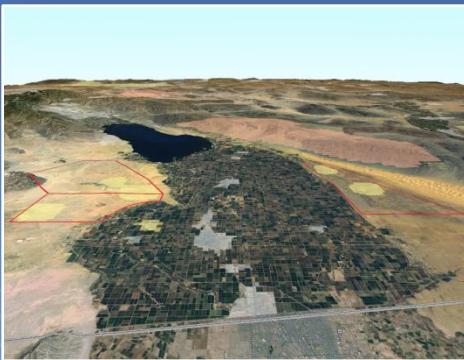


# RANGE SUSTAINABILITY

## GIS APPLICATIONS AND ENTERPRISE IMPLEMENTATIONS



May 4, 2009

Gabe Lovasz, Geospatial Analyst, ManTech SRS

Molly Rodriguez, Geospatial Analyst, ManTech SRS

-In Support of-

The Office of the Secretary of Defense

<b>Report Documentation Page</b>			<i>Form Approved OMB No. 0704-0188</i>		
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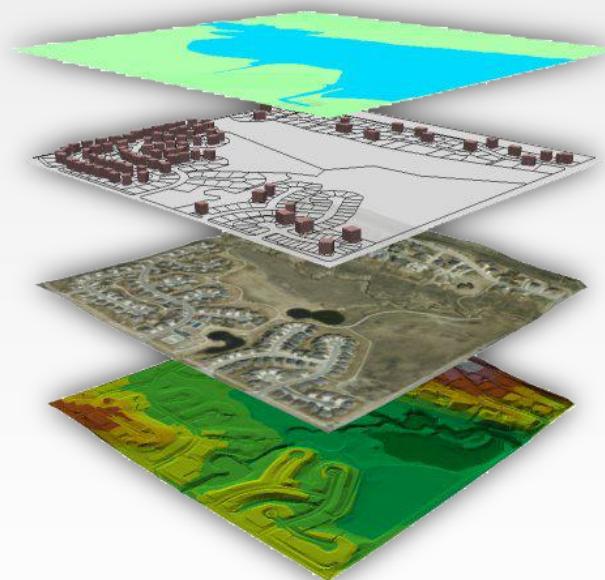
# AGENDA

- What is GIS?
- GIS tools for the Range Planner/Operator
- Encroachment Concerns
- Regional Partnerships
- Range Sustainment Efforts (GIS Components)

# WHAT IS GIS?

*“A geographic information system (GIS) integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information.”*

*Environmental Systems Research Institute (ESRI)*



# GIS TOOLS FOR THE RANGE PLANNER / OPERATOR

## Desktop Applications

- ESRI's ArcGIS Desktop Suite (Arview, ArcEditor, ArcInfo)
- ESRI's ArcGlobe
- "Spatial Analyst" and "3D Analyst" extensions
- Range Managers Toolkit (RMTK) ArcGIS extension

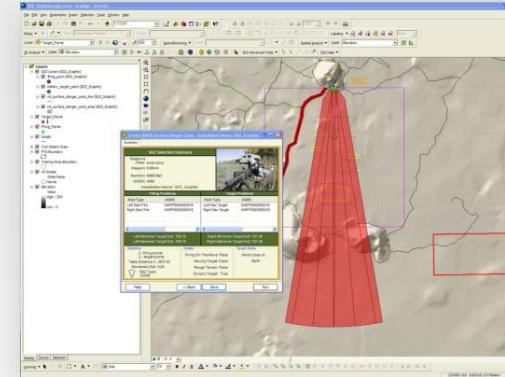
## Web-Based GIS

- ArcGIS Server (Army Range Mapper)
- Range Managers Toolkit (RMTK) extension
- Google Earth

# RANGE MANAGERS TOOLKIT (RMTK)

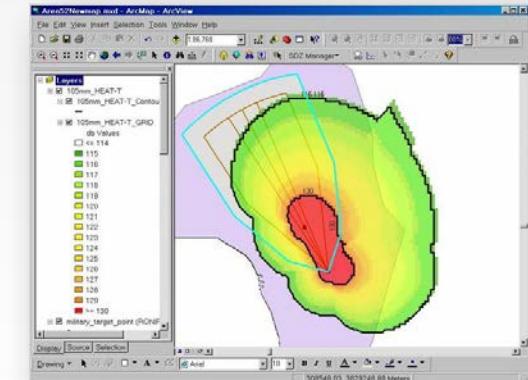
## Surface Danger Zone (SDZ) Tool

- “Wizard” driven
- Army and Marine Corps weapons inventory
- Supports creation of combined live fire exercise/combined arms exercise ranges



## Noise Tool

- Model noise contours based on weapon, munitions, location, and atmospheric condition
- Helps support situational awareness



## Weapons Danger Zone (WDZ) Tool

- Air to ground weapons platforms
- Supports rotary, fixed-wing, and unmanned aerial systems

# RANGE SUSTAINMENT CONSIDERATIONS

*"The Office of the Deputy Under Secretary of Defense (Installations and Environment) Sustainable Ranges Initiative is charged to develop a comprehensive response to **encroachment** in order to preserve DoD's capability to train and test on its land and sea ranges, operating areas, and airspace."*

*-Sustainable Ranges Initiative*

## Encroachment Concerns

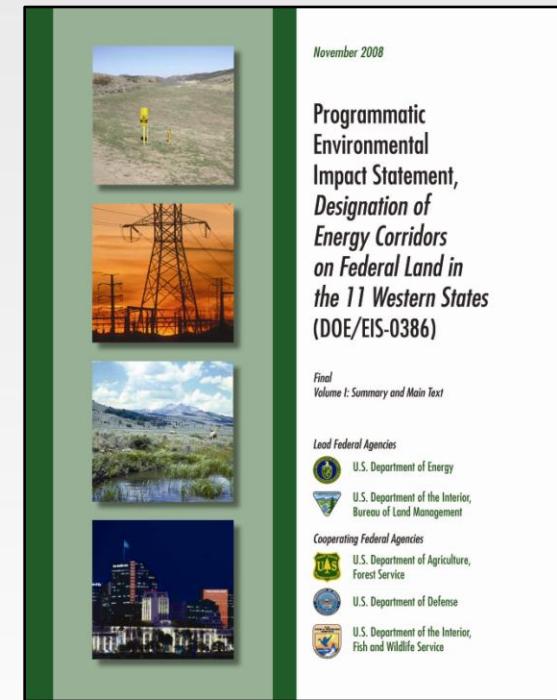
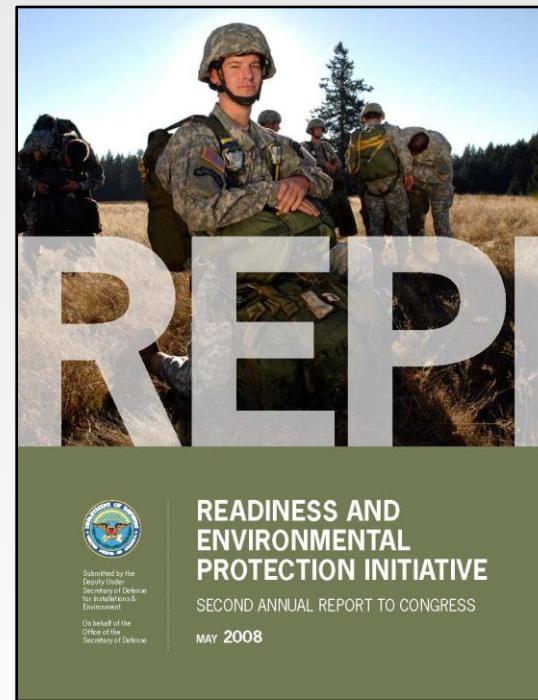
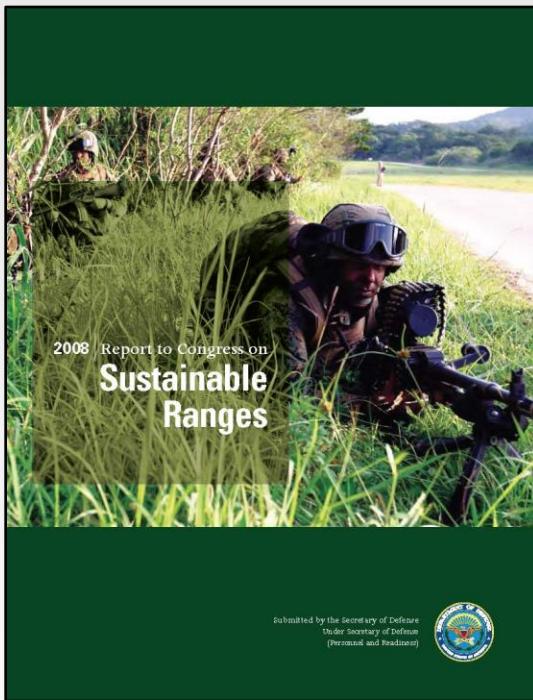
Threatened & Endangered Species/Critical Habitat	Cultural Resources
Airspace	Wetlands
Noise Restrictions	Water Quality/Supply
Adjacent Land Use	Range Transients

# REGIONAL PARTNERSHIP EFFORTS

- Encroachment
  - Most encroachment activities outside of DoD fence line.
  - Addressing encroachment difficult to manage and sometimes beyond DoD's reach.
- Value of Regional Partnerships
  - Share GIS and decision-support information.
  - Link efforts with other stakeholders and federal agencies.
  - Support community-driven planning and compatible land use.
  - Promote rural landscapes and working lands at regional scale.
  - Support of readiness mission.



# RANGE SUSTAINMENT AND GIS



Report to Congress on  
Sustainable Ranges

Readiness and Environmental  
Protection Initiative (REPI)

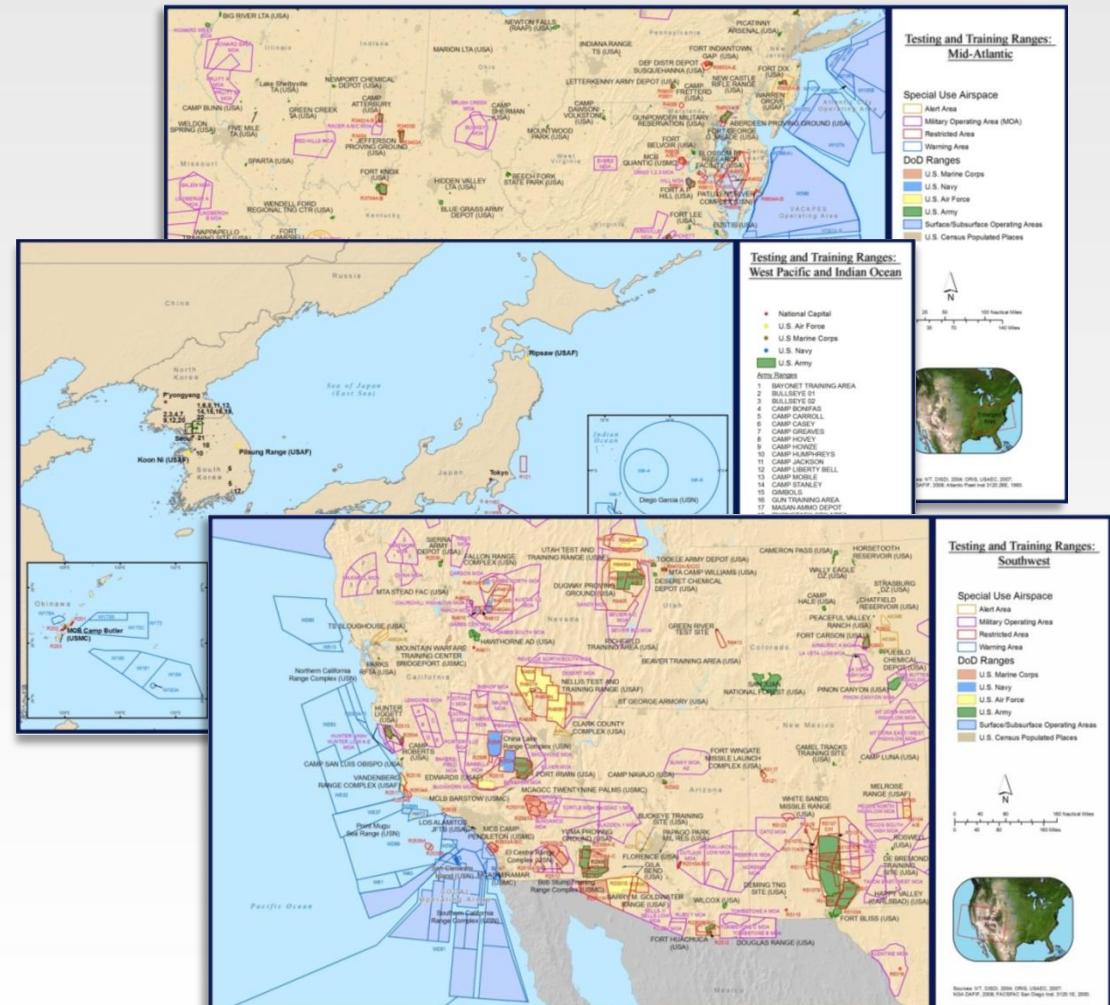
West-wide Energy  
Corridor PEIS

# REPORT TO CONGRESS ON SUSTAINABLE RANGES

- Report Addresses Two Congressional Reporting Requirements Under National Defense Authorization Act (NDAA):
  - Develop a comprehensive plan to address training constraints (FY2003 NDAA, Section 366)
  - Report on the impacts of encroachment (FY2004 NDAA, Section 320)
- GIS Component is the Report Inventory
  - Regional Range and Special Use Airspace (SUA) Maps
  - Tabular Range Inventory
  - SUA Inventory
  - Military Training Route (MTR) Inventory

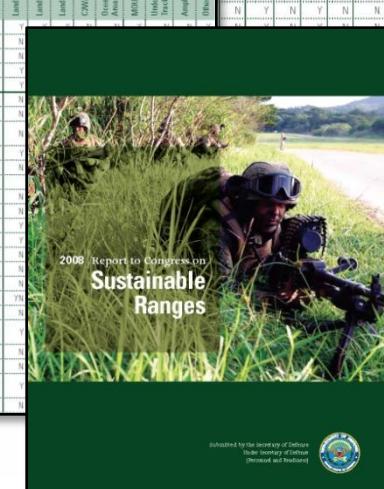
# RANGE AND SPECIAL USE AIRSPACE REGIONAL MAPS

- Maps Include Land Ranges, Airspace, and Ocean Surface/Subsurface Operating Areas
- Land Range GIS data (footprints) from Services
- Airspace GIS data
  - National Geospatial Intelligence Agency (NGA)
  - Digital Aeronautical Flight Information File (DAFIF)



# RANGE INVENTORY

- Range Inventory is Compiled from Service Inventories and Geodatabases
- Organized by Service and Contains:
  - Name of range or range complex
  - State/country
  - Size information
  - Range type (air-to-air, air-to-ground)

Training and Testing Range Complex Inventory																				
Military Service	Range Complex	United States (US) or Overseas (OS)	State or Country	Command/ Component	Range Description				Land Area for Range (sq mi)	Special Use Requests (sq mi)	Safe Surface Area sq mi	Underwater Tracking Area sq mi	No-Air Acoustic Surface	Air-to-Ground	Land Maneuver	Land Impact Area	Land Firing Range	CW/NW	Oceans/Offshores	Other
					Land Area (sq mi)	Water Area (sq mi)	Underwater Area in Surface	No Guard												
	Fort Gordon	US	GA	TRADOC	49,149	0	0	0	0	0	N	N	Y	Y	Y	N	N	N	Y	
	Camp Grafton	US	ND	TRADOC	11,380	0	0	0	0	0	N	Y	Y	N	N	N	N	N	Y	
	Camp Guersney	US	WY	ARMY	35,062	46	0	0	0	0	N	Y	Y	N	N	N	N	N	Y	
	Hunter Liggett	US	CA	USARC	153,072	113	0	0	0	0	N	Y	Y	N	N	N	N	N	Y	
	Keeslerkaus Mill RES	US	HI	ARMY	434	0	0	0	0	0	N	Y	Y	N	N	N	N	N	N	
Army	Fort Gordon	US	GA	TRADOC	49,149	0	0	0	0	0	N	N	Y	Y	Y	N	N	N	Y	
	Camp Grafton	US	ND	TRADOC	11,380	0	0	0	0	0	N	Y	Y	N	N	N	N	N	Y	
	Camp Guersney	US	WY	ARMY	35,062	46	0	0	0	0	N	Y	Y	N	N	N	N	N	Y	
	Hunter Liggett	US	CA	USARC	153,072	113	0	0	0	0	N	Y	Y	N	N	N	N	N	Y	
	Keeslerkaus Mill RES	US	HI	ARMY	434	0	0	0	0	0	N	Y	Y	N	N	N	N	N	N	
	Fort McCoy	US	WI	TRADOC	1,000	0	0	0	0	0	N	N	Y	Y	Y	N	N	N	Y	
	Fort Sill	US	OK	TRADOC	1,000	0	0	0	0	0	N	N	Y	Y	Y	N	N	N	Y	
	Fort Stewart	US	GA	TRADOC	1,000	0	0	0	0	0	N	N	Y	Y	Y	N	N	N	Y	
	Fort Wainwright	US	AK	TRADOC	1,000	0	0	0	0	0	N	N	Y	Y	Y	N	N	N	Y	
	Fort Zinnia	US	GA	TRADOC	1,000	0	0	0	0	0	N	N	Y	Y	Y	N	N	N	Y	
Army Corps	MCB Quantico	US	VA	MARDC	64,000	276	0	0	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	
	MCLB Albany	US	GA	MARCOM	4	0	0	0	N	N	N	N	N	N	N	N	N	N	Y	
	MCLB Barstow	US	CA	MARCOM	2,439	0	0	0	N	N	N	N	N	N	N	N	N	N	Y	
	MCMTC Bridgeport	US	CA	TECOM	16,089	0	0	0	N	N	N	N	N	N	N	N	N	N	Y	
	MRC Parachute Island	US	SC	TECOM	1,000	0	0	0	N	N	N	N	N	N	N	N	N	N	Y	
	Atlantic City	US	NJ	CFC	0	5,585	4,413	4,415	Y	Y	N	N	N	N	N	N	N	N	Y	
	Atlantic Test Range (Patuxent River)	US	MD, VA	NAVALIR	5,700	3,491	390	0	Y	Y	N	N	N	N	N	N	N	N	Y	
	Atlantic Undersea Test and Evaluation Center (AUTEC)	US	BAH	NAVEA	0	970	1,320	195	Y	Y	N	N	N	N	N	N	N	N	Y	
	Benton Point	US	MA	CFC	12,449	16,099	13,454	13,494	Y	Y	N	N	N	N	N	N	N	N	Y	
	Cherry Point	US	NC	CFC	0	16,718	16,718	16,718	Y	Y	N	N	N	N	N	N	N	N	Y	
Navy	Chincoteague	US	VA	NAVALIR	114,209	13,861	0	0	Y	Y	N	N	N	N	N	N	N	N	Y	
	Diego Garcia	US	BIOT	CFF	0	32,692	0	0	Y	Y	N	N	N	N	N	N	N	N	Y	
	El Centro	US	CA	CFC	45,940	256	0	0	Y	Y	N	N	N	N	N	N	N	N	Y	
	Fallos	US	NV	CFF	232,491	14,182	0	0	Y	Y	N	N	N	N	N	N	N	N	Y	
	Guantanamo	US	CUBA	CFF	0	13,775	13,775	13,775	Y	Y	N	N	N	N	N	N	N	N	Y	
	Gulf of Mexico	US	FL, MS, TX	CFF	100,071	36,993	17,489	17,489	Y	Y	N	N	N	N	N	N	N	N	Y	
	Hawaiian Islands	US	HI	CFF	303	58,645	214,808	214,808	Y	Y	N	N	N	N	N	N	N	N	Y	
	Jacksonville	US	FL, GA	CFC	17,728	37,443	50,098	50,098	Y	Y	N	N	N	N	N	N	N	N	Y	
	Japan	US	Japan	CFF	0	11,615	0	0	Y	Y	N	N	N	N	N	N	N	N	Y	
	Key West	US	FL	CFC	1	24,812	8,282	8,282	Y	Y	N	N	N	N	N	N	N	N	Y	
Marine Corps	Marine Islands	US	CNMI, Guam	CFF	24,954	8,726	8,698	8,698	Y	Y	N	N	N	N	N	N	N	N	Y	
	Newport	US	RI	CFC	0	13,095	27,298	27,298	Y	Y	N	N	N	N	N	N	N	N	Y	
	Northern California (NOCAL)	US	CA	CFC	0	19,622	0	0	Y	Y	N	N	N	N	N	N	N	N	Y	
	Northwest Training Range Complex	US	CA, OR, WA	CFF	45,674	42,714	120,363	120,363	Y	Y	N	N	N	N	N	N	N	N	Y	
	Okinawa	US	Japan	CFF	0	29,090	0	0	Y	Y	N	N	N	N	N	N	N	N	Y	
	Yuma Proving Ground	US	AZ	CFC	0	11,615	0	0	Y	Y	N	N	N	N	N	N	N	N	Y	
	Zaragoza	US	Spain	CFC	0	11,615	0	0	Y	Y	N	N	N	N	N	N	N	N	Y	
 <p>2008 Report to Congress on <b>Sustainable Ranges</b></p>																				

Initiated by the Secretary of Defense  
Under Secretary of Defense  
(Personnel and Readiness)

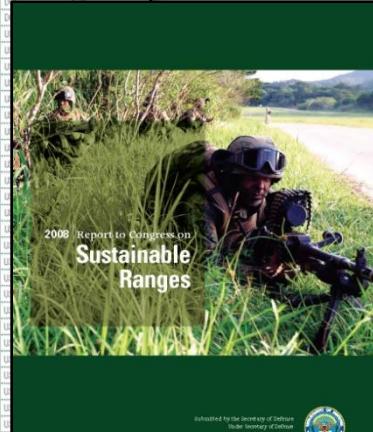
# AIRSPACE INVENTORIES

- Special Use Airspace (SUA) and Military Training Route (MTR) Inventories
  - Information comes directly from National Geospatial Intelligence Agency's (NGA) Digital Aeronautical Flight Information File (DAFIF)
  - Service inventories list the airspace names

Military Training Route Inventory					
Military Training Route	Originating Agency <sup>y</sup>	Scheduling Agency <sup>y</sup>	Effective Times	Length (NM) <sup>x</sup>	
IR046	347 Rescue Wing, Detachment 1/RD, 8707 North Golf Course St., MacDill AFB, FL 33	347 Rescue Wing, Detachment 1/RD, 8707 North Golf Course St., MacDill AFB, FL 3	0700–2400 local, daily	171	
IR047	347 Rescue Wing, Detachment 1/RD, 8707 North Golf Course St., MacDill AFB, FL 33	347 Rescue Wing, Detachment 1/RD, 8707 North Golf Course St., MacDill AFB, FL 3	0700–2400 local, daily	67	
IR048	347 Rescue Wing, Detachment 1/RD, 8707 North Golf Course St., MacDill AFB, FL 33	347 Rescue Wing, Detachment 1/RD, 8707 North Golf Course St., MacDill AFB, FL 3			
IR049	347 Rescue Wing, Detachment 1/RD, 8707 North Golf Course St., MacDill AFB, FL 33	347 Rescue Wing, Detachment 1/RD, 8707 North Golf Course St., MacDill AFB, FL 3			
IR050	347 Rescue Wing, Detachment 1/RD, 8707 North Golf Course St., MacDill AFB, FL 33	347 Rescue Wing, Detachment 1/RD, 8707 North Golf Course St., MacDill AFB, FL 3			
IR051	347 Rescue Wing, Detachment 1/RD, 8707 North Golf Course St., MacDill AFB, FL 33	347 Rescue Wing, Detachment 1/RD, 8707 North Golf Course St., MacDill AFB, FL 3			
IR052	347 Rescue Wing, Detachment 1/RD, 8707 North Golf Course St., MacDill AFB, FL 33	347 Rescue Wing, Detachment 1/RD, 8707 North Golf Course St., MacDill AFB, FL 3			
IR055	347 WG, Detachment 1/RD, 8707 North Golf Course St., MacDill AFB, FL 33621-5205	347 WG, Detachme			
IR056	347 WG, Detachment 1/RD, 8707 North Golf Course St., MacDill AFB, FL 33621-5205	347 WG, Detachme			
IR057	16 OSS/DDOA, Hurlburt Field, FL 32554 DSN 579-7409, C850-884-7409	16 OSS/DDOO, Hurl			
IR058	16 OSS/DDOA, Hurlburt Field, FL 32554 DSN 579-7409, C850-884-7409	16 OSS/DDOO, Hurl			
IR059	16 OSS/DDOA, Hurlburt Field, FL 32554 DSN 579-7409, C850-884-7409	16 OSS/DDOO, Hurl			
IR062	COMSTRKFIGHTWING(LANT), Oceana NAS, Virginia Beach, VA 23460 DSN 433-4013, C757-43	FACSFAC VACAP			
IR066	14 OSS/DSOP, Columbus AFB, MS 39710 DSN 742-7560/7633, C962-434-7560/7633	50 FTS, Columbu			
IR067	14 OSS/DSOP, Columbus AFB, MS 39710 DSN 742-7560/7633, C962-434-7560/7633	48 FTS, Columbu			
IR068	14 OSS/DSOP, Columbus AFB, MS 39710 DSN 742-7560/7633, C962-434-7560/7633	48 FTS, Columbu			
IR070	14 OSS/DSOP, Columbus AFB, MS 39710-5000 DSN 742-7560/7633, C962-434-7560/7633	48 FTS, Columbu			
IR077	FACSFAC, Pensacola, FL 32508-5217 DSN 922-2735, C850-452-2735	Same as Originat			
IR078	FACSFAC, Pensacola, FL 32508-5217 DSN 922-2735, C850-452-2735	Same as Originat			
IR079	FACSFAC, Pensacola, FL 32508-5217 DSN 922-2735, C850-452-2735	Same as Originat			
IR080	FACSFAC, Pensacola, FL 32508-5217 DSN 922-2735, C850-452-2735	Same as Originat			
IR081	FACSFAC, Pensacola, FL 32508-5217 DSN 922-2735, C850-452-2735	Same as Originat			
IR082	FACSFAC, Pensacola, FL 32508-5217 DSN 922-2735, C850-452-2735	Same as Originat			
IR083	FACSFAC, Pensacola, FL 32508-5217 DSN 922-2735, C850-452-2735	Same as Originat			

Special Use Airspace Inventory					
2007 SUA Name	Controlling Agency	Range Complex/ Installation Name	Upper Altitude	Lower Altitude	Military Service <sup>x</sup> Area (nm) <sup>x</sup>
R4008N	FAA, LOS ANGELES ARTCC	Nellis AFB	UNITD	SURFACE	DOE 1,280
R4008S	FAA, LOS ANGELES ARTCC	Nellis AFB	UNITD	SURFACE	
R4009	FAA, LOS ANGELES ARTCC	Nellis AFB	UNITD	SURFACE	
R401A	FAA, WASHINGTON, DC ARTCC	Aberdeen Proving Ground	UNITD	SURFACE	
R401B	FAA, WASHINGTON, DC ARTCC	Aberdeen Proving Ground	010000AMSL	SURFACE	
R2101	FAA, ATLANTA ARTCC	Ashton Arroyo Depot	005000AMSL	SURFACE	
R2102	FAA, SALT LAKE CITY ARTCC	Brose	FL228	SURFACE	
R2103	FAA, CAPE APP	Camp Edwards	006000AMSL	SURFACE	
R2104	FAA, MINNEAPOLIS ARTCC	Camp Grayling	FL230	SURFACE	
R2105	FAA, MINNEAPOLIS ARTCC	Camp Grayling	009000AMSL	SURFACE	
R2106	FAA, MINNEAPOLIS ARTCC	Camp Grayling	002000AMSL	SURFACE	
R2107	FAA, DENVER ARTCC	Camp Guernsey	007999AMSL	SURFACE	
R2108	FAA, DENVER ARTCC	Camp Guernsey	025000AMSL	080000AMSL	
R2109C	FAA, DENVER ARTCC	Camp Guernsey	FL300	215000AMSL	
A605	FAA, ATLANTA ARTCC	Camp Man III	0007004G1	SURFACE	
R4301	FAA, MINNEAPOLIS ARTCC	Camp Riley	FL270	SURFACE	
R2404	FAA, OAKLAND ARTCC	Camp Roberts	015000AMSL	SURFACE	
R2405	FAA, MEMPHIS ARTCC	Chaffee	FL300	SURFACE	
R2406	FAA, MEMPHIS ARTCC	Chaffee	FL300	SURFACE	
R2407	FAA, MEMPHIS ARTCC	Chaffee	FL300	SURFACE	
R2408	FAA, BOSTON ARTCC	Devon Reserve Forces Training Area	001999AMSL	SURFACE	
R2409A	FAA, BOSTON ARTCC	Devon Reserve Forces Training Area	003995AMSL	020000AMSL	
R4101B	FAA, BOSTON ARTCC	Florence Training Site	010000AMSL	SURFACE	
R2310A	FAA, ALBUQUERQUE ARTCC	Florence Training Site	017000AMSL	100000AMSL	
R2310B	FAA, ALBUQUERQUE ARTCC	Florence Training Site	FL350	170000AMSL	
R2310C	FAA, ALBUQUERQUE ARTCC	Florence Training Site	FL350	170000AMSL	
HILL MOA, VA	FAA, POTOMAC APP	Fort A P Hill	003000AMSL	SURFACE	
R6001	FAA, RICHMOND TWR	Fort A P Hill	005000AMSL	SURFACE	
BENNING MOA, GA	FAA, COLUMBUS TWR	Fort Benning	008000AMSL	005000AMSL	
R3002A	FAA, AT&T, COLUMBUS	Fort Benning	004000AMSL	SURFACE	
R3002B	FAA, AT&T, COLUMBUS	Fort Benning	008000AMSL	040000AMSL	
R3002C	FAA, AT&T, COLUMBUS	Fort Benning	014000AMSL	080000AMSL	
R3002D	FAA, AT&T, COLUMBUS	Fort Benning	008000AMSL	SURFACE	USA 79



2008 Report to Congress on Sustainable Ranges

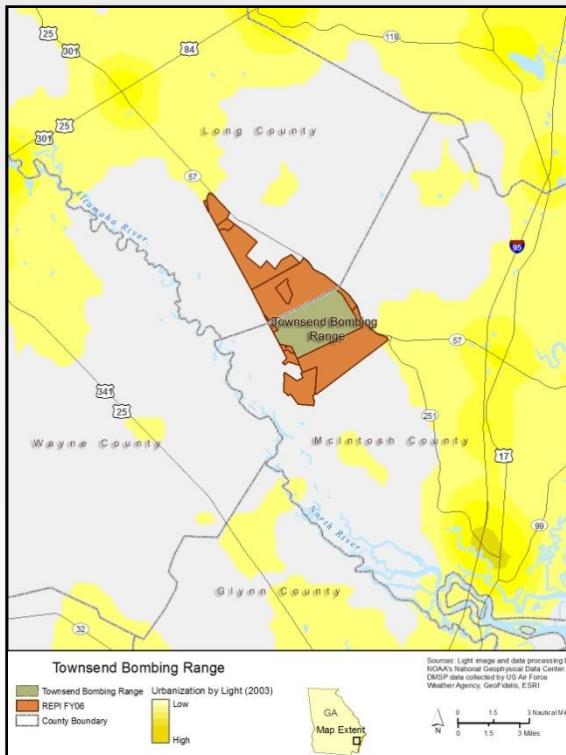
Indicated by the Secretary of Defense  
Under Secretary of Defense  
(Space and Theater)

# READINESS ENVIRONMENTAL PROTECTION INITIATIVE (REPI)

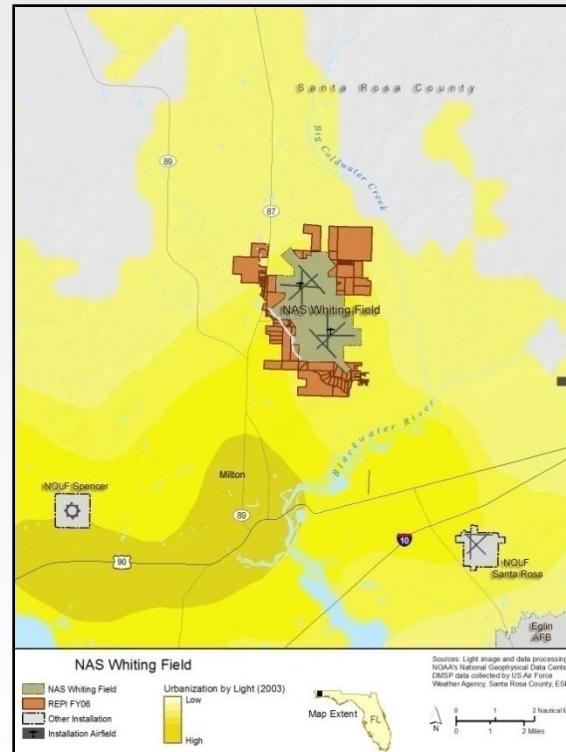
- Supports Compatible Land Use and Conservation Initiatives at Ranges and Installations
- Section 2864(a) FY2004 NDAA
  - Allows the Services to enter into agreements with private conservation organizations or with state and local governments
  - Allows the Services to cost-share acquisition of restrictive/conservation easements from willing sellers
- Serves Several Purposes
  - Protect land for conservation purposes
  - Limit incompatible development around ranges and installations

# USE OF GIS IN THE REPI REPORT

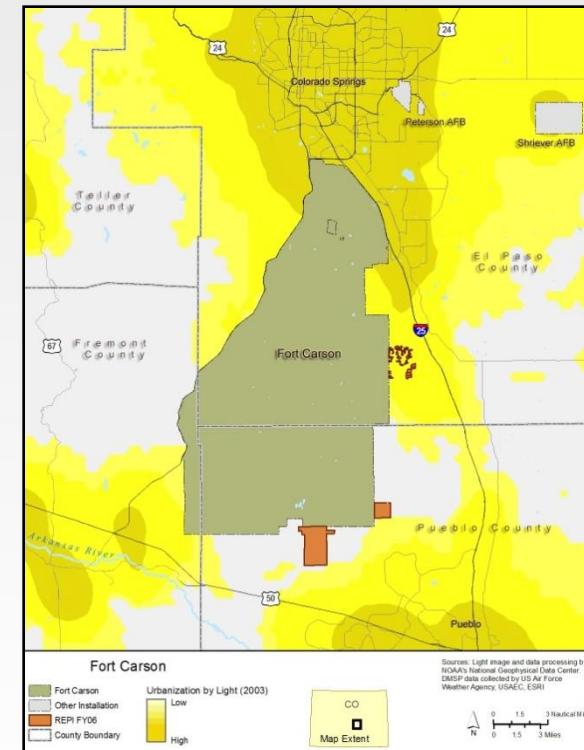
- GIS Component
  - Maps of the installation/range and the parcels acquired with REPI funds



Townsend Bombing Range USMC

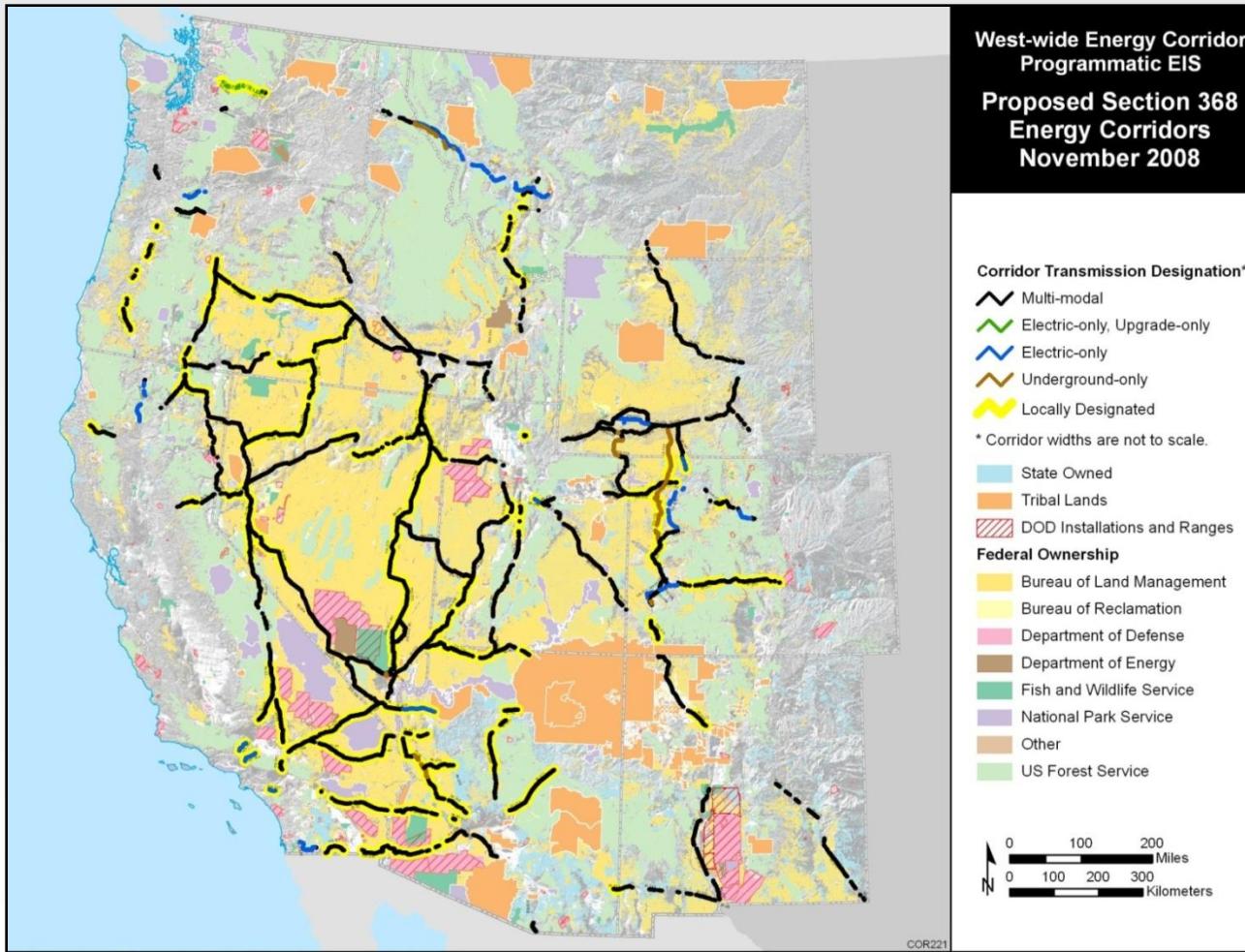


NAS Whiting Field (USN)



Fort Carson (USA)

# WEST-WIDE ENERGY CORRIDOR PEIS



Energy Act 2005  
Section 368:

- Designation of energy corridors on federal land in 11 Western states
- Oil, gas, hydrogen pipelines & electrical transmission lines

# WEST-WIDE ENERGY CORRIDOR PEIS

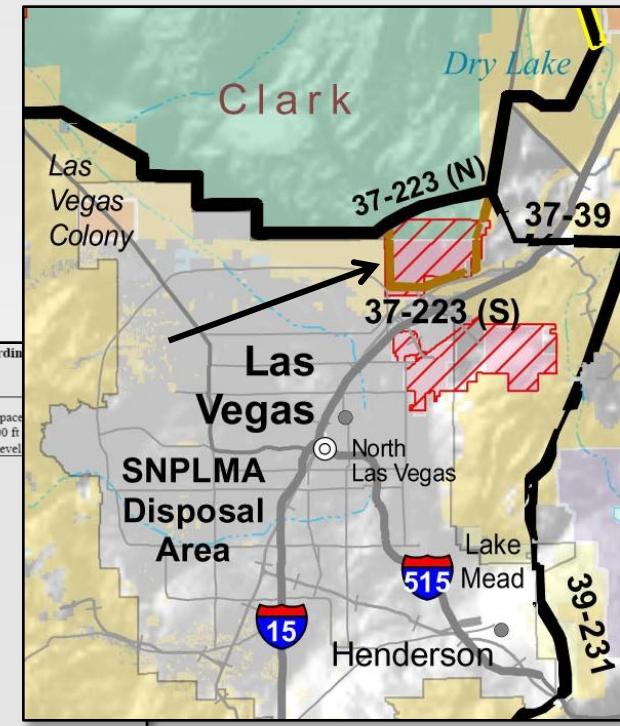
- GIS was an Integral Part of Energy Corridor Designation Process
  - Used to plan location of proposed corridors
- Range Sustainment Perspective
  - Corridor locations relative to ranges and installations
  - Cross low-level (1,000ft) Special Use Airspace (SUA) and Military Training Routes (MTRs)
- Provided GIS Data to Dept. of Energy
  - DoD ranges and installation boundaries
  - Low-level Special Use Airspace and Military Training Routes

# ENERGY CORRIDOR GIS ANALYSIS

- Identified Intersections
  - Energy corridor and range/installation boundaries, and low-level airspace
  - Is training impacted?

TABLE L-1 Proposed Energy Corridors That Would Require DOD Coordination Project Planning<sup>a</sup>

State	Corridor	Military Training Route with Floor <1,000 ft above Ground Level	Special Use Airspace with Floor <1000 ft above Ground Level
Arizona	30-52	X	
	41-46	X	
	46-269	X	
	46-270	X	
	61-207	X	
	62-211	X	
	68-116	X	
	113-116	X	
	115-208	X	
	115-238	X	
	116-206	X	
	234-235	X	
California	3-8	X	
	6-15	X	
	8-104	X	
	15-104	X	
	16-104	X	
	18-23	X	X
	23-25	X	X
	23-106	X	X
	27-41	X	X
	27-225	X	X
	27-266		X
	30-52	X	X
	101-263	X	
	108-267	X	
	115-238	X	X
	261-262	X	
	264-265	X	
	87-277	X	
Colorado			
Idaho	29-36		
	36-228		X
	49-112	X	X
	15-17	X	
Nevada	15-104	X	



Nellis Small Arms Range

# MORE INFORMATION

Environmental Systems Research Institute (ESRI)

<http://www.esri.com/>

Western Regional Partnership (WRP)

<http://www.wrpinfo.org>

Southeast Regional Partnership for Planning and Sustainability

<http://www.serppas.org/>

2008 Readiness Environmental Protection Initiative (REPI) Report and 2008 Report to Congress on Sustainable Ranges

<https://www.denix.osd.mil/portal/page/portal/denix/range/Home>

West-Wide Energy Corridor PEIS

<http://corridoreis.anl.gov/>

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